SIEMENS

DP/FF Link

Manual

01/2007
A5E01090102-01

Safety information

This manual contains notices you should always observe in the interest of your personal safety and to prevent material damage. The notices referring to your safety are highlighted by a safety alert symbol. Notices only referring to property damage have no safety alert symbol. The warning notices are represented in descending order according to their degree of severity.

Danger
Indicates that death or severe injury is **inevitable** if appropriate precautions are not taken.

Warning
Indicates the **risk** of death or severe injury if appropriate precautions are not taken.

Caution
Notices with warning triangle indicate the risk of minor injury if appropriate precautions are not taken.

Caution
Notices without warning triangle indicate the risk of property damage if appropriate precautions are not taken.

Notice
Indicates the risk of unwanted results or states if the corresponding notice is ignored.

Always observe the warning notice which indicates the highest risk level. Any warning notice with triangle which indicates the risk of injury may be appended an additional warning of the risk of property damage.

Qualified personnel

The corresponding device / system may only be set up and operated in connection with this documentation. Only **qualified personnel** are allowed to commission and operate a device / system. Qualified personnel in the context of safety-related information in this documentation are persons who are authorized to commission, to ground, and to tag equipment, systems and circuits in accordance with safety standards.

Use as intended

Note the following:

Warning
The device may only be used for applications as described in the catalog or in the technical description, and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens Proper shipping, storage, assembly and installation, and its operation and maintenance as recommended are prerequisite for faultless and safe operation of the product.

Trademarks

All designations marked with the ® are registered trademarks of Siemens AG. Third parties using for their own purpose any other names which refer to trademarks might infringe upon the rights of the trademark owners.

Disclaimer of Liability

We have checked the contents of this manual for agreement with the hardware and software described. Siemens cannot guarantee full agreement as deviations cannot be ruled out with certainty. However, the information in this manual is reviewed at regular intervals, and any necessary corrections are included in subsequent editions.

Siemens AG
Automation and Drives
Postfach 4848
90437 NUREMBERG
GERMANY

A5E01090102-01
01/2007

Preface

Purpose of this manual

This manual supports you in using the **DP/FF Link**. It explains how you can address actuators and sensors in PCS 7 using the DP/FF Link fieldbus.

Prerequisites

Requirements for working with this manual:

- Knowledge of PCS 7
- Basic knowledge of PROFIBUS DP
- Basic knowledge of FOUNDATION Fieldbus

Data volume with GSD file

The Toolset DVD *Process Control System; PCS 7-Software Toolset* contains the GSD file you require for engineering the hardware configuration of DP/FF Link. It is automatically included in the installation of PCS 7 V7.0.

Objectives

This manual is focused on helping you to install, configure and operate the DP/FF Link and participating components.

Scope of delivery

DP/FF Link is available in the following versions:

Order number	Description
6DL4400-1AA	FF interface with four FF-H1 segments and integrated power conditioners

Contents of the package:

- Anybus DP Link
  - "Anybus DP Link" (configuration cannot be changed)
  - 1-m serial connecting cable (1-m RS485 patch cable with 9-pin d-sub connector, integrated bus terminator with 2-wire connection and cable grommets)
- Fieldbus Interface Module
  - Fieldbus Interface Module 3420 (with four FF-H1 segments and integrated power conditioners)
  - Network cable (RJ45)

Scope of this manual

This documentation is valid for the software package *Process Control System; PCS 7 Toolset* V7.0 and higher.

Additional documentation

The reference material listed below is an additional source of information for the PCS 7 software package and can be obtained from your local Siemens office.

Topic	Document
PCS 7	DVD *SIMATIC PCS 7; Manual Collection* http://www.pcs7.de/ > [Technical Documentation] > [Manuals Vx.y]
Fieldbus Interface Module	Reference Manual Rosemount 3420 Fieldbus Interface Module http://www.emersonprocess.com/
Anybus DP Link	User Manual Anybus Communicator for Profibus http://www.anybus.com/ (ABC Profibus User Manual)

Target readership

Readership of this manual are PCS 7 project engineers.

Additional Support

If you have any further questions relating to your SIMATIC product, please contact the Siemens representative at your local agencies and offices. The addresses are available in the catalogs and on the Internet.

Personnel qualification requirements

Only **qualified personnel** are allowed to commission and operate this equipment Qualified personnel in the context of these operating instructions or warnings are professionals who have acquired adequate knowledge of the installation, assembly, commissioning and operation of this product and who have been qualified appropriately, for example, by means of:

- Training, instructions, or authorization to switch power circuits, devices or systems on and off, and to tag and ground such equipment in compliance with current safety standards
- Training or instructions concerning the maintenance and use of appropriate safety equipment in accordance with current safety standards
- First Aid training

SIMATIC Training Center

Siemens offers a number of training courses to get you started with the SIMATIC PCS 7 process control system. Contact your regional Training Center or the central Training Center in D-90327 Nuremberg, Tel. +49 - (0) 911 – 895 – 3154.

Table of contents

Technical description, installation guidelines, operation

1

1.1 DP/FF Link applications

FOUNDATION Fieldbus devices in PCS 7

In addition to PROFIBUS, the FOUNDATION Fieldbus has been accepted as a standard in process industry Both systems have evolved from the "Interoperable Systems Project“ (ISP) which was launched in the year 1992 by an international association of companies with the objective of creating a harmonized fieldbus standard

Both bus systems are oriented on the IEC fieldbus model which resolves current communication tasks with the help of the following two bus systems:

- A low-speed, optionally intrinsically safe H1 bus (PROFIBUS PA or FF-H1)
- A high-speed H2 master bus system (PROFIBUS DP)

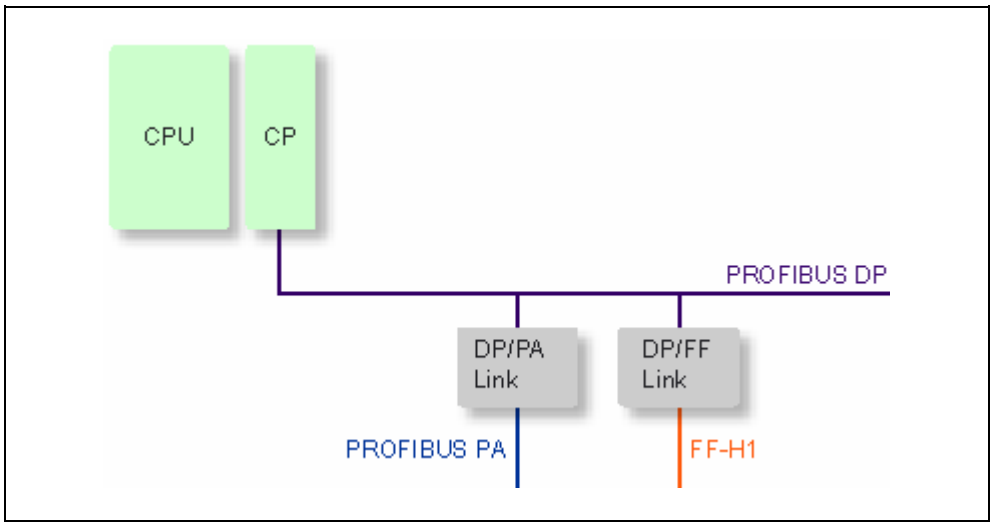


Figure 1-1 Integration of the DP/FF-H1 link

Structure

The DP/FF Link consists of the following components:

- Anybus DP Link
  (pre-configured; the configuration for PROFIBUS DP cannot be changed)
- Fieldbus Interface Module (FIM3420)
  (configurable to suit corresponding applications)

Requirements

The DP/FF Link fulfils the following requirements:

- Central engineering for FF field devices
- Cyclic and non-cyclic communication
- Integration into PCS 7 Maintenance Station

Connection

The Anybus DP Link is connected to the DP master system as DP slave.

The Anybus DP Link and Fieldbus Interface Modules are interconnected using the included patch cable (MODBUS interface) (1-m RS485 patch cord with 9-pin d-sub connector, integrated bus terminator with 2-wire connection and cable grommets).

The Fieldbus Interface Module is connected to the system / terminal bus by way of a network cable (RJ45).

Quantity framework

- Up to 16 DP/FF Links can be operated on a PROFIBUS segment
- A Y-Link supports the connection of one DP/FF Link

- The DP/FF Link supports up to 64 FF-H1 field devices, which include in particular:
  - 8 digital outputs
  - 8 digital inputs
  - 32 analog inputs
  - 16 analog outputs
- The DP/FF Link supports the connection of four FF-H1 segments

Performance

The sampling rate at each FF-H1 segment depends on the number of scanned function blocks.

Number of scanned function blocks per FF-H1 segment	Sampling time
1	0.3 sec
2	0.4 sec
4	0.5 sec
8	0.7 sec
16	1.0 sec
32	2.7 sec
64	3.1 sec
128	7.0 sec

Fieldbus Interface Module

The Fieldbus Interface Module is a MODBUS/FF-H1 Gateway. It can be operated as distributed MODBUS RTU slave by way of the MODBUS communications processor Anybus DP Link.

The connected field devices and the image of I/O data can be configured directly using the integrated Web Interface of the Fieldbus Interface Module. This functionality requires a PC with Ethernet connection and a browser which supports JAVA Runtime Environment.

Anybus DP Link

The process image of the Anybus DP Link comprises 226 byte of input data and 130 bytes of output data. Anybus DP Link automatically updates and decouples this process image. The process values and status bytes of the FF-H1 field devices are transferred in the user data on the PROFIBUS. See also Figure 1-2.

Communications principle

The Anybus DP Link cyclically synchronizes its process image with MODBUS memory of the Fieldbus Interface Module (see the diagram below)

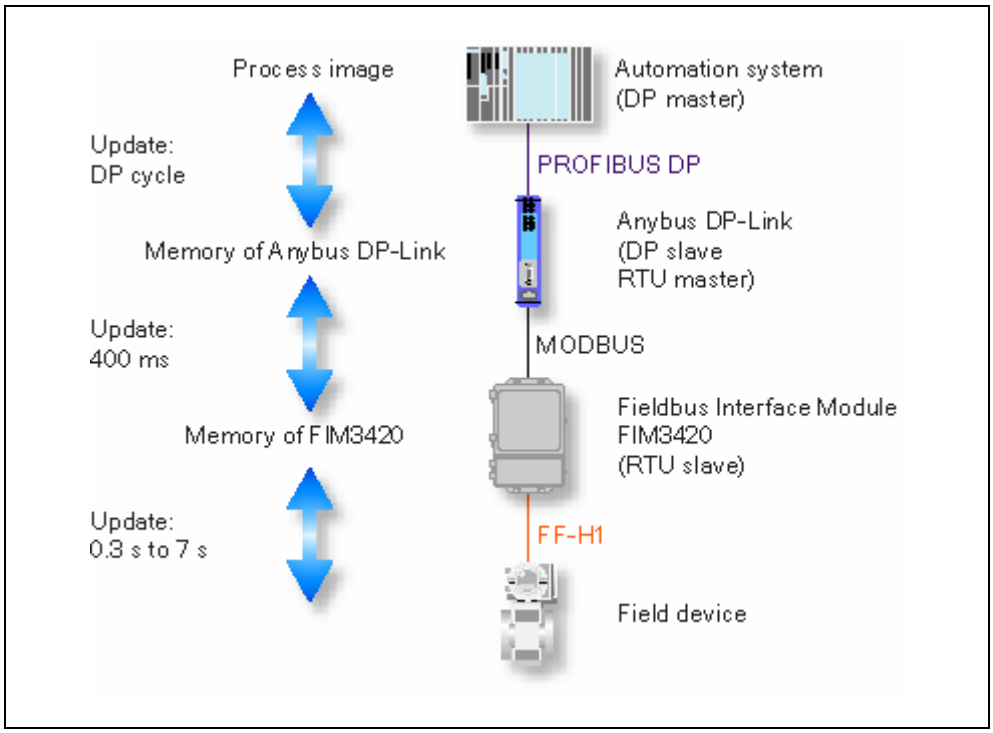


Figure 1-2 Principle of communication with DP/FF Link

Data flow

The diagram below illustrates the data flow between participating components (AS <-> Anybus DP Link <-> FIM3420 <-> field device).

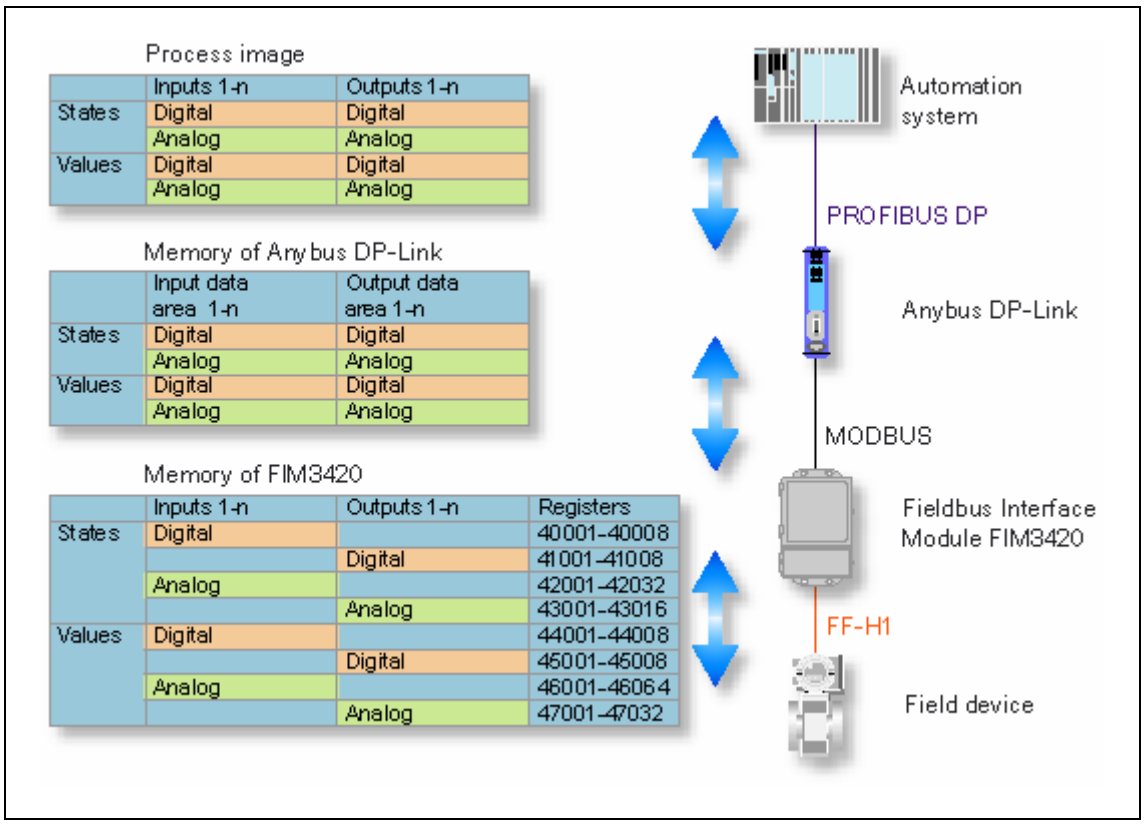


Figure 1-3 Data flow of the DP/FF Link

1.1.1 Operation as DP slave on a DP master system

Operation of Anybus DP Link as DP slave on a DP master system

Each Anybus DP Link (DP slave) is approved for operation with one Fieldbus Interface Module.

You can operate up to four FF-H1 segments on a single Fieldbus Interface Module

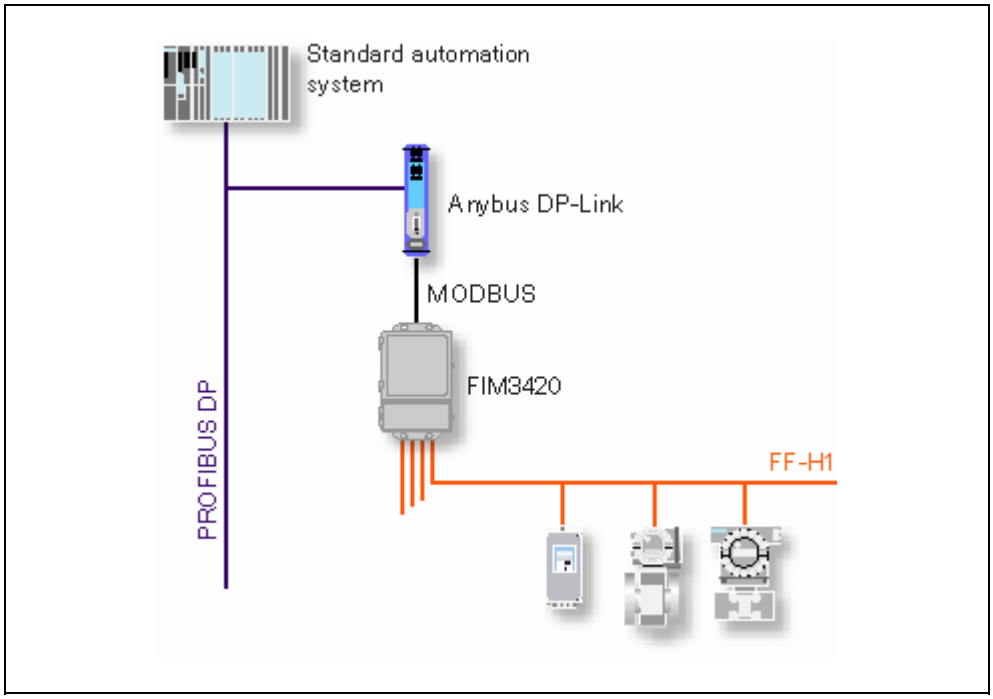


Figure 1-4 FF-H1 integration into a standard AS

1.1.2 Operation as DP slave downstream of a Y-Link

The risk of production loss can be minimized by integrating fault-tolerant components into the process control system. The structure of the process control system is redundant in order to ensure fault tolerance. The FF-H1 field devices can be connected to a fault-tolerant automation system by way of Y-Link.

Operating Anybus DP Link as DP slave downstream of a Y-Link

Each Anybus DP Link (DP slave) is approved for operation with one Fieldbus Interface Module.

You can operate up to four FF-H1 segments on a single Fieldbus Interface Module

One Anybus DP Link can be interconnected downstream of the Y-Link (limited I/O range). The remaining addresses can be assigned to DP slaves.

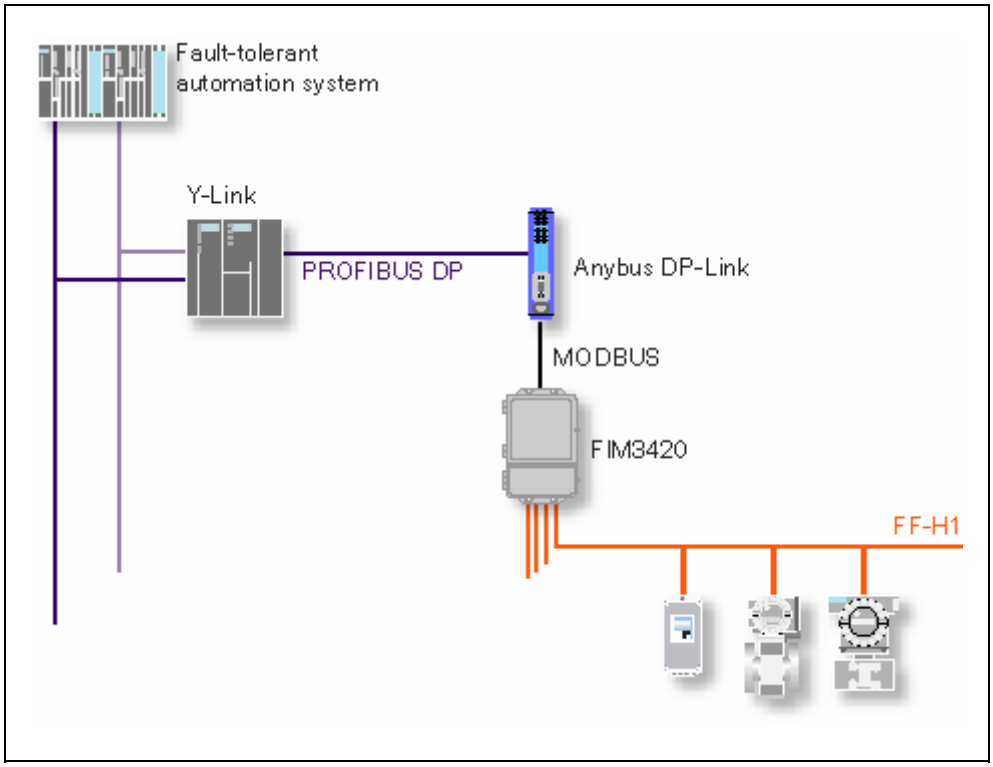


Figure 1-5 FF-H1 integration into a fault-tolerant AS

Configuration

2

2.1 Overview of the engineering tasks

What?	Where?
Hardware installation and wiring Including field devices	-
Hardware configuration • Installation of Anybus DP Link and assignment of slots • Configuration of the Anybus DP Link on a DP master system • Configuration of the Anybus DP Link	HW Config
System settings at the Fieldbus Interface Module Configuring the Fieldbus Interface Module • Network address Users can pre-configure the network address using the integrated Web Interface of the Fieldbus Interface Module (LAN connection). • MODE communication parameter • Configuring the FF-H1 field devices Installation of the FF-H1 device descriptions (integrated hardware catalog) • Programming of the field devices (EDD)	Web Interface
Configuration in the CFC	CFC Editor

2.2 Hardware installation and wiring

Overview

The picture below shows an example of the hardware installation and wiring, based on the integration of an FF-H1 into a fault-tolerant automation system.

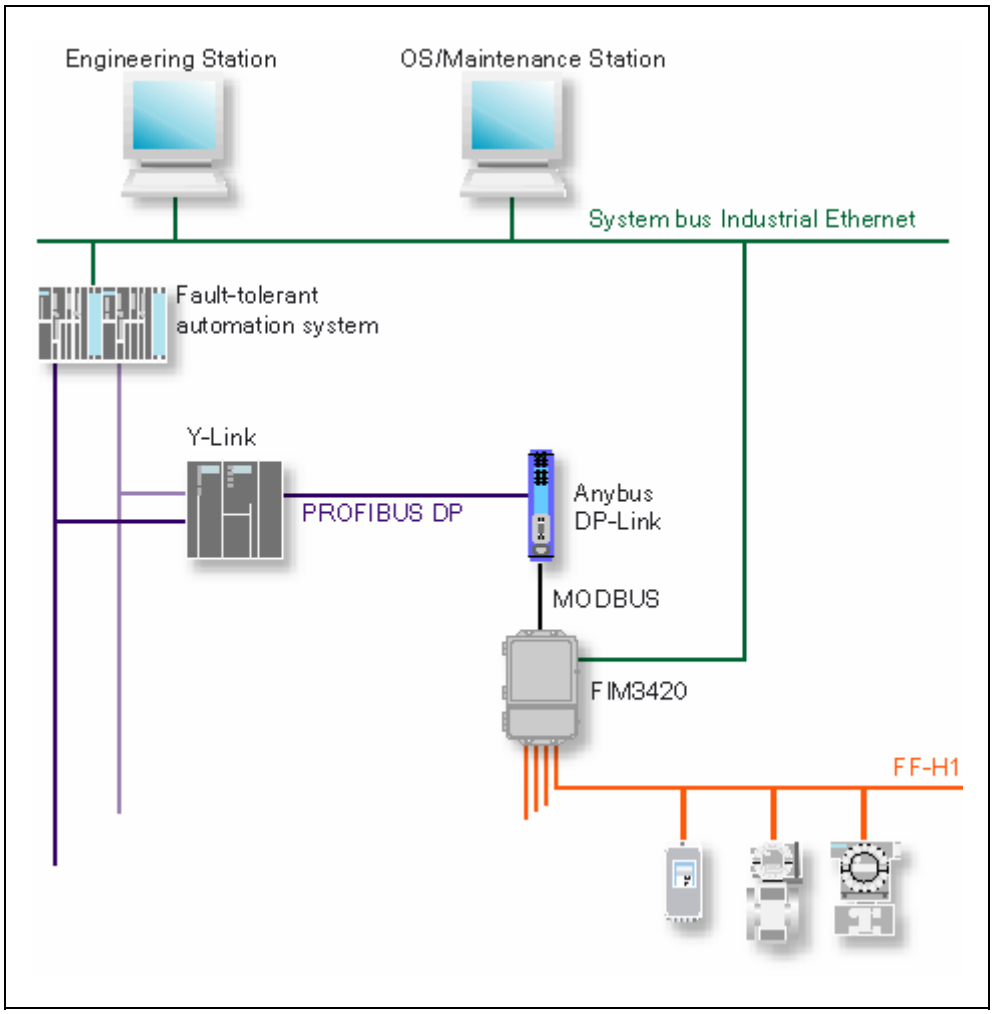


Figure 2-1 Integration of DP/FF Link into the automation environment (example with Y Link)

You require a cross-over cable for initial commissioning of the FIM3420 (see the section "Configuring the Fieldbus Interface Module"). Next, connect the FIM3420 to the system bus using a standard LAN cable (FIM3420 diagnostics on Maintenance Station).

Installing and wiring the Anybus DP Link

All necessary wiring information is available in the following documentation:

User Manual
Anybus Communicator for Profibus
http://www.anybus.com/
(ABC Profibus User Manual)

Installing and wiring the Fieldbus Interface Module

All necessary wiring information is available in the following documentation:

Reference Manual
Rosemount 3420
Fieldbus Interface Module
http://www.emersonprocess.com/

Connecting the field devices

Each Fieldbus Interface Module can be operated with up to FF-H1 segments to which the field devices are connected by way of corresponding fieldbus distributors (for example, Split Connectors).

Note

Each FF-H1 bus must be terminated at both ends.

Additional information is available in the *Reference Manual Rosemount 3420; Fieldbus Interface Module.*

2.3 Hardware configuration in PCS 7 (HW Config)

Anybus DP Link as DP slave in HW Config

The Anybus DP Link is implemented as DP slave in the PCS 7 hardware configuration.

The Anybus DP Link is available in the hardware catalog at "PROFIBUS-DP > Additional field devices > Gateway > Anybus DP Link".

Use the integrated Web Interface to configure the Fieldbus Interface Module.

2.3.1 Configuration of the Anybus DP Link on a DP master system

Introduction

An Anybus DP Link operated as DP slave provides 226 bytes of input and 130 bytes of output user data.

Analog sensors, followed by analog actuators, represent the predominant devices in a normal PCS 7 configuration. The greater portion of the I/O area is therefore reserved for analog input data, followed by analog output data.

Prerequisites

- A DP master system was created in HW Config
- You opened the project in SIMATIC Manager

Procedure

Note

Each Fieldbus Interface Module must be assigned an Anybus DP Link (DP slave) in HW Config.

1. Select a SIMATIC station from the component view and double-click the "Hardware" object in the detail window
   The hardware configuration dialog of the AS opens
2. Check whether the "PCS7_V70" profile is set in the "Profile" drop-down list box in the hardware catalog
3. Select the Anybus DP Link from the "PROFIBUS DP > Additional field devices > Gateway > Anybus DP Link" entry in the hardware catalog. Drag-and-drop this module to the DP master system
   The "Properties - PROFIBUS Interface" dialog box opens
4. Select an available address from "PROFIBUS address", or use the address which is already set at the device Set an address within the range from 1 to 99

5. Click "OK"
   The dialog box closes. The screenshot below shows an example of the resultant hardware configuration (the addressing depends on the remaining configuration):

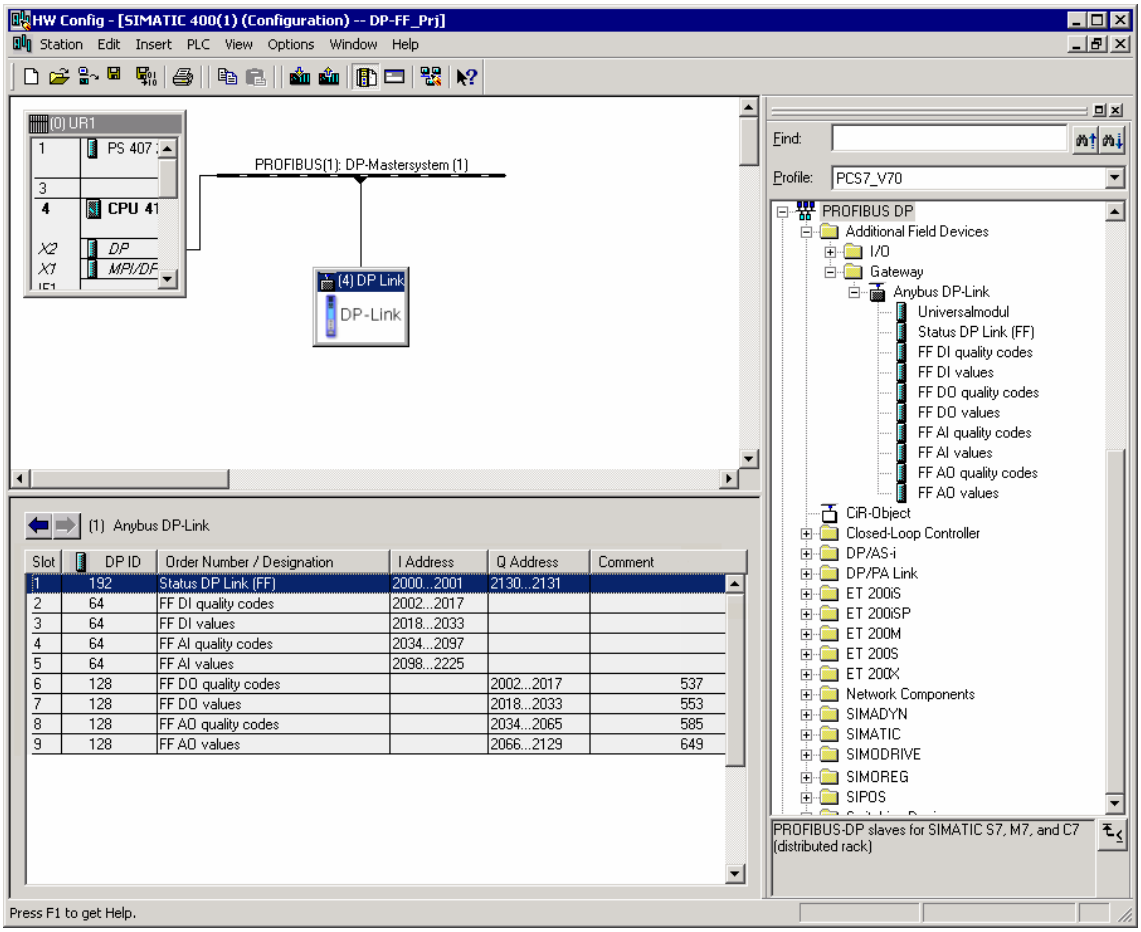


Figure 2-2 Example: Hardware configuration with integrated Anybus DP Link

6. Double-click Slot 1 in the list.
   The "Properties – DP slave" dialog box opens.
7. Enter your values in the "Output" group, or accept the default values

8. Enter your values in the "Input" group, or accept the default values
   The screenshot below shows the dialog box:

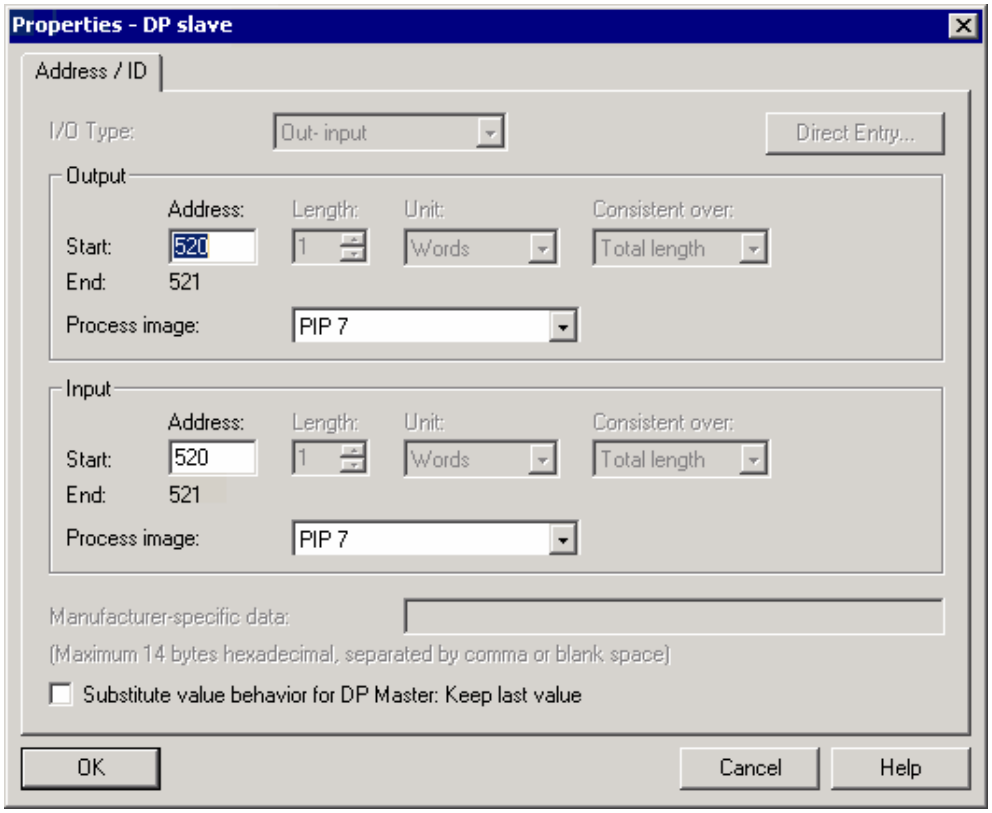


Figure 2-3 Status Anybus DP Link

9. Click "OK"
10. Configure the remaining slots as described in steps 5 to 8
11. Select a slot from the assignment list, and then select the **Edit Symbols...** command from the shortcut menu.
    The "Edit Symbols" dialog box opens
12. Enter a symbolic name and your comments
13. Click "OK"
14. Repeat this procedure for the other slots
15. Select the **Station > Save and Compile** command

Note

The "Substitute response of the DP master: Hold last value" may **not** be activated.

2.3.2 Configuration of the Anybus DP Link downstream of a Y Link

Prerequisites

- You installed PCS 7 V7.0
- You created a DP master system in HW Config
- You configured a Y Link in HW Config
- You opened the project in SIMATIC Manager

Procedure

Note

Assign each Fieldbus Interface Module one Anybus DP Link (DP slave) in HW Config.

There are only slight differences compared to the configuration without Y Link (see the chapter 2.3.1).

1. Select the required SIMATIC 400H station from the component view and double-click the "Hardware" object in the detail window
   The hardware configuration dialog of the AS opens
2. Check whether the "PCS7_V70" profile is set in the "Profile" drop-down list box in the hardware catalog
3. Select the Anybus DP Link from the "PROFIBUS DP > Additional field devices > Gateway > DP Link (FF)" entry in the hardware catalog. Drag-and-drop this module to the DP master system of IM 157.
   The "Properties – PROFIBUS interface" dialog box opens.
4. Select an available address from "PROFIBUS address", or use the address which is already set at the device Set an address within the range from 1 to 99

5. Click "OK".
   This closes the dialog box. The screenshot below shows the hardware configuration:

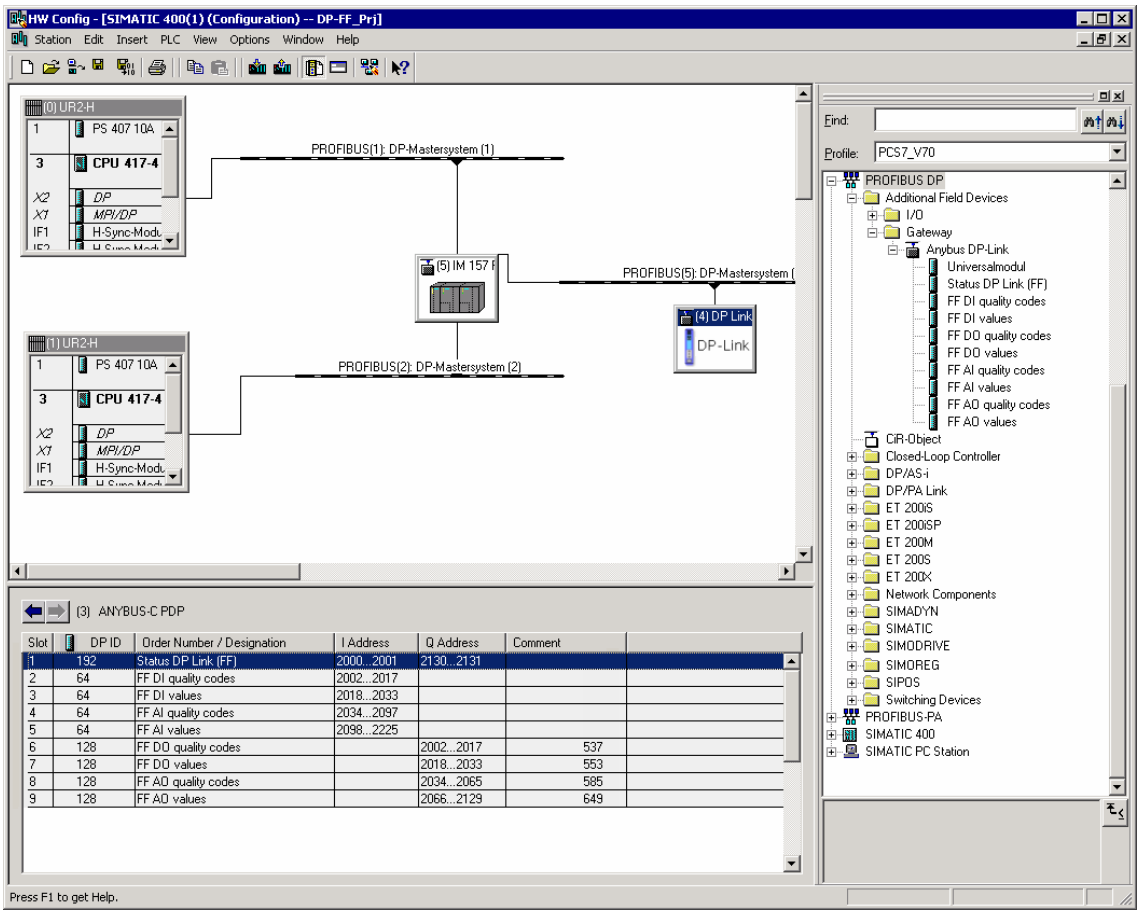


Figure 2-4 Hardware configuration with integrated Anybus DP Link on a Y Link (IM 157)

6. Configure all other items as shown in steps 6 to 15, chapter 2.3.1.

2.4 Configuring the Fieldbus Interface Module

Introduction

The Fieldbus Interface Module is configured using its integrated Web Interface. You can open this interface in a standard Web browser which supports Java Runtime Environment.

The sections below describe all engineering tasks required in order to prepare the Fieldbus Interface Module for operation within the DP/FF Link system.

Assignment of registers

The values and corresponding quality codes of the FF devices are mapped to MODBUS registers in the course of FIM configuration.

Each MODBUS register comprises two bytes.
Analog values require two registers (four bytes); the status and digital values require one register (two bytes).

Assign each data type a register area in the Fieldbus Interface Module to which the process values and status data are saved (see Figure 2-5).

Example of the register assignment

Example of the assignment of registers to two FF devices:
1. FF device 1 (1 digital input; 1 analog output)
FF device 2 (1 digital input; 1 analog input)

MODBUS registers	I/O	Data byte	FF device
41001	Quality Code, digital input	2	1
41002	Quality Code, digital input	2	2
42001	Quality Code, analog input	2	2
43001	Quality Code, analog input	2	1
44001	Value, digital input	2	1
44002	Value, digital input	2	2
46001	Value, analog input	4	2
47001	Value, analog output	4	1

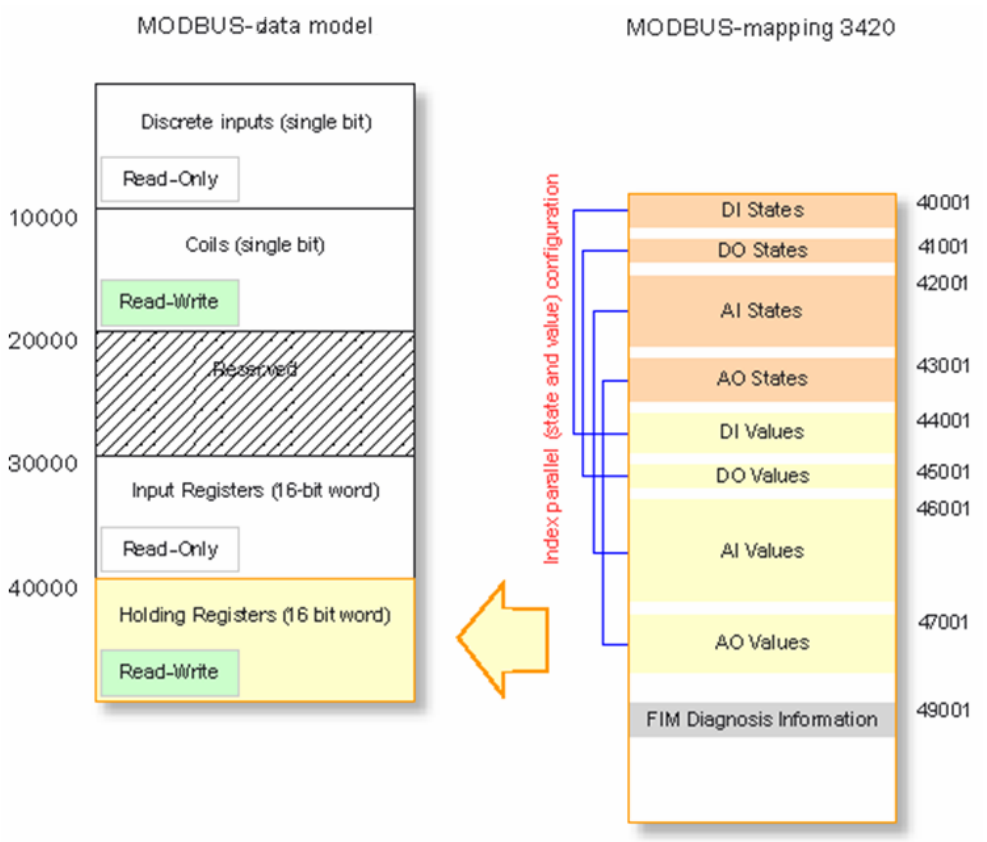


Figure 2-5 Assignment of I/O data in the MODBUS data model

Prerequisites for initial commissioning

- A Web browser and Java Runtime Environment V1.4.1 or higher are installed on your computer
- A (temporary) LAN connection by way of cross-over Ethernet cable is available to interconnect your computer with the Fieldbus Interface Module
- Firmware V2.3.23 or higher is installed on the Fieldbus Interface Module

Note

- The IP address of your computer and of the Fieldbus Interface Module must be set within the same address space (on the same network).
- The firmware version of your Fieldbus Interface Module is displayed in the lower right section of the Web Interface

Initial commissioning procedures

1. Start the Web browser (Internet Explorer in this example)
2. Set the emergency address of the Fieldbus Interface Module at the Address entry
   192.168.1.10
   The login dialog of the Fieldbus Interface Module opens

Note

You can view this emergency address in the tree structure at " Setup > Network > Backup Address". DO NOT change this address.

3. Enter the "admin" user and the password "fieveladmin" (see the Fieldbus Interface Module Reference Manual).
4. Select "Setup > Network > Address" from the tree structure
5. Enter the network parameters of your Fieldbus Interface Module
   IP address: 192.168.1.x
   Subnet mask: 255.255.255.0
   Host name: <name of the FIM>
   Gateway: <gateway address>
   Domain: <domain name> (if required)
6. Click "Submit" and restart the device (see the Fieldbus Interface Module Reference Manual).
7. Remove the cross-over Ethernet cable

Prerequisites for further configuration and operation

You interconnected your computer (Engineering Station) and the FIM with the terminal / system bus for further configuration and for subsequent operation of the FIM within a PCS 7 system (see the image in the section "Hardware installation and wiring").

- PCS 7 V7.0 was installed on your computer (Engineering Station)
- A Web browser and Java Runtime Environment V1.4.1 or higher are installed on your computer
- Your computer and the Fieldbus Interface Module are interconnected with the LAN by way of standard Ethernet cable (terminal bus / system bus, for example)
- Firmware V2.3.23 or higher is installed on the Fieldbus Interface Module

Procedure

1. Start the Web browser (here: Internet Explorer) on a computer (Engineering Station) which is also connected to the terminal / system bus
2. Go online to the Web Interface of the Fieldbus Interface Module using the previously set IP address
   The configuration dialog box of the Fieldbus Interface Module opens
3. Enter the user name and password (see above)
4. Select "Setup > Modbus > Communication" from the tree structure
   The "Modbus Communication" dialog box opens.
5. Enter the MODBUS communication data as shown in the screenshot below

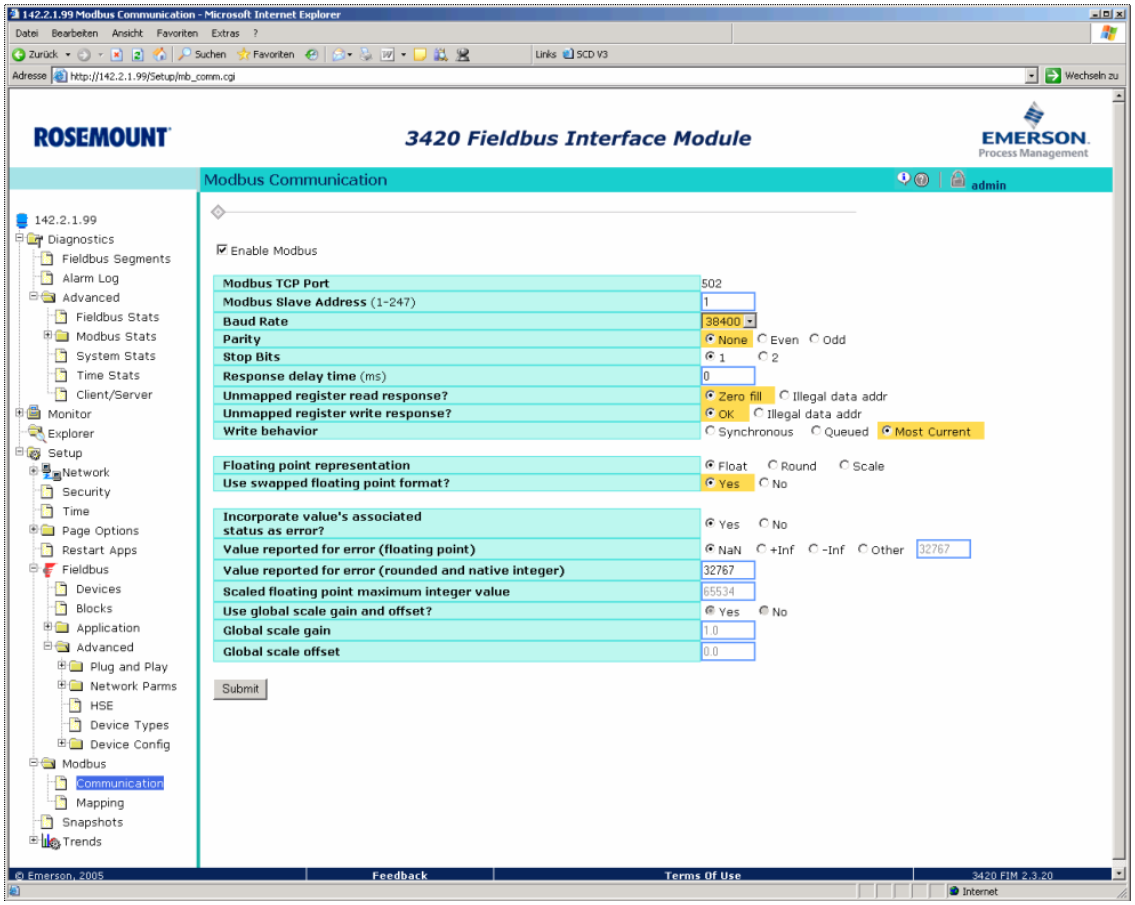


Figure 2-6 MODBUS communication settings

6. Select "Setup > Modbus > Mapping" from the tree structure

Note

The field devices should already be connected and configured for mapping.

7. Click "New entry" to generate a new entry
8. Enter your status values in the corresponding registers:

Status values with data type ...	**in register ...**
Status digital input	40001 – 40008
Status digital output	41001 – 41008
Status analog input	42001 – 42032
Status analog output	43001 – 43016

9. Enter your process values in the corresponding registers:

Process values with data type ...	**in register ...**
Digital input	44001 – 44008
Digital output	45001 – 45008
Analog input	46001 – 46064
Analog output	47001 – 47032

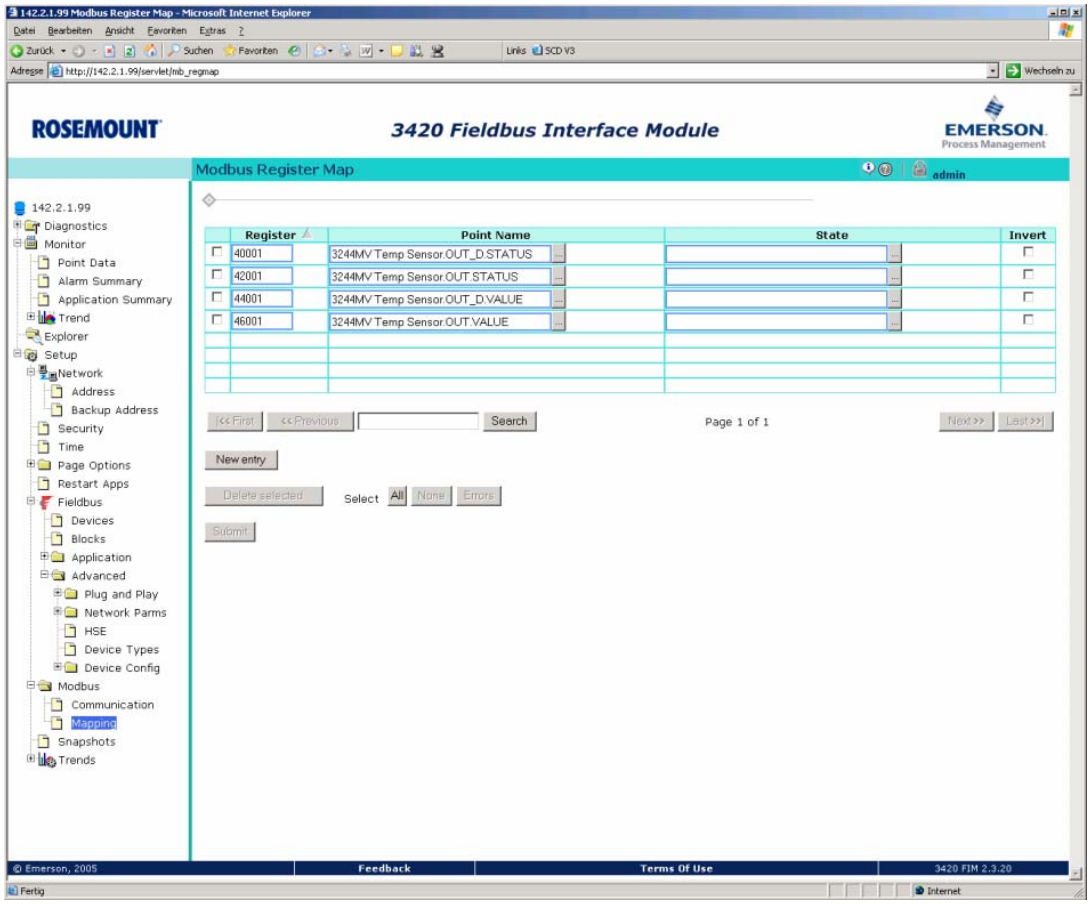


Figure 2-7 Example: Assignment configuration

2.5 Configuring the FF-H1 field devices

Introduction

You require the so-called Device Description (DD) files to configure the connected FF-H1 field devices. Download the DD files from the Internet site of the manufacturer or at http://www.fieldbus.org/ and then upload the files to your FIM.

Prerequisites

- You computer is connected with the FIM via terminal bus / system bus
- Your station is online to the Web Interface of the Fieldbus Interface Module

Procedure

1. Select "Setup > Fieldbus > Advanced > Device Types" from the tree structure
   The "Device Types" dialog box opens.
2. Select the source file (ZIP file name and path) and click on "upload device descriptor"
   This function uploads the DD file to your Fieldbus Interface Module. You can now configure the connected FF-H1 field device.

Note

Detailed information relating to the configuration of the FF-H1 field devices is available in the manufacturer documentation included with the FF-H1 field device and in the *Fieldbus Interface Module Reference Manual*.

Connected field devices

The FIM continuously polls all connected field devices and automatically identifies the devices which are currently available You can check the status by selecting the "Setup > Fieldbus > Advanced > Device Types" menu

- Yellow marking: All known field device types (with installed DD) which are not connected
- Green marking: All connected field device types with appropriate DD installation
- Red marking: All missing DDs for connected field device types

Note

Select the
"Setup > Fieldbus > Device" entry to check whether the corresponding device instances are available and select
"Setup > Fieldbus > Blocks" to check whether you can load the blocks.

2.6 Configuration in the CFC

Generate module drivers

The "Generate module drivers" function inserts driver block into the CFC charts as required for each DP/FF Link (DP slave) you configured in HW Config. Prerequisite is that the project contains at least one FF_A_xx signal processing block which is interconnected with an address of the corresponding DP slave.

The "Generate module drivers" function generates the addresses of the inserted driver blocks and their interconnection with the signal processing blocks.

Note

A detailed description of the driver blocks is available in the chapter 4 "Block description" and in the corresponding online help for the blocks.

Diagnostics

3

3.1 PCS 7 Maintenance Station

Introduction

The Anybus DP Link is implemented by default as standard DP slave in PCS 7 Maintenance Station. System support of diagnostics up to the Anybus DP Link corresponds to system support of the distributed I/O. Diagnostics of the FIM and of the connected FF-H1 field devices is handled in the user program.

The section below describes all steps to take for integrating the FF devices into the diagnostics screens.

ASSETMON block

FF devices are monitored by means of the ASSETMON block. Each FF device is assigned an ASSETMON block. The channel information of an FF device which returns more than one Quality Code is grouped and passed to the ASSETMON block by way of a multiplexer (see the chapter 3.1.2 Plant Hierarchy – Diagnostics", paragraph "Example installation of the "ASSETMON" CFC).

3.1.1 Process Device Plant View

Configuration in PDM

Select **View > Process Device Plant View > Insert > SIMATIC PDM > TAG** in SIMATIC Manager in order to insert and configure a TAG for each FF device you want to include in SIMATIC PDM diagnostics. Each TAG is assigned an unambiguous PLT ID. The data entered in PDM can be identified and displayed in the PCS 7 Maintenance Station by evaluating the PLT-ID.

The TAG in our example is named "PLT Temperature" and is assigned PLT-ID 0x01000010.

Figure 3-1 Process Device Plant View

Additional information is available in the *Process Control System PCS 7; Operator Station* Configuring Manual, in the *PDM; The Process Device Manager* Manual, and in the online help of the ASSETMON block.

3.1.2 Plant Hierarchy – Diagnostics

Prerequisites

- The diagnostics station has been set up
- A user diagnostics area has been set up

Additional information is available in the *Process Control System PCS 7; Service Support and Diagnostics* Manual.

Configuration in the plant hierarchy (PH)

Insert an additional folder which contains a CFC chart at the level of AS objects in the diagnostics branch of the PH for the AS station.

Create a folder of the same name in the PH of the OS station at the level of AS objects and then insert a picture (here: PLT).

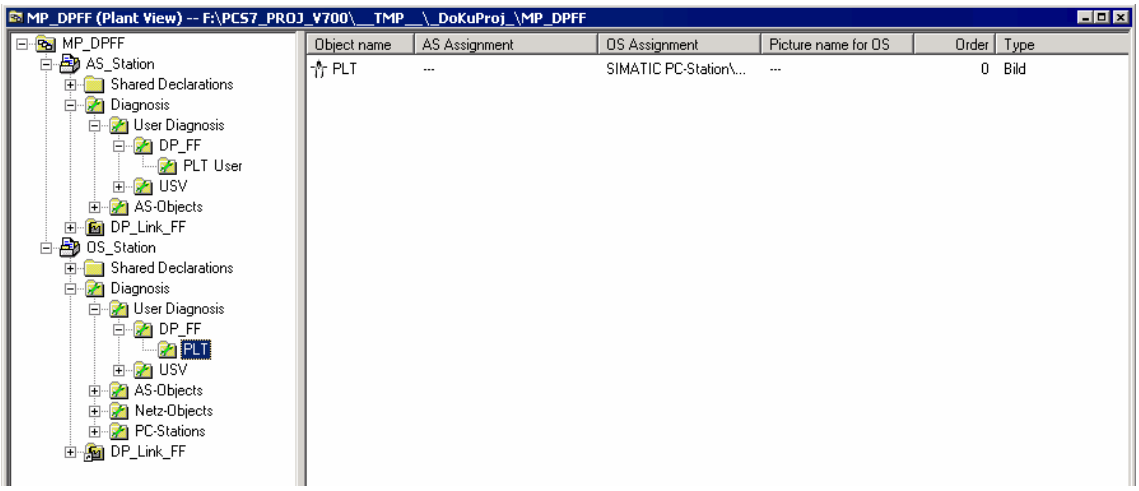


Figure 3-2 PH of diagnostics

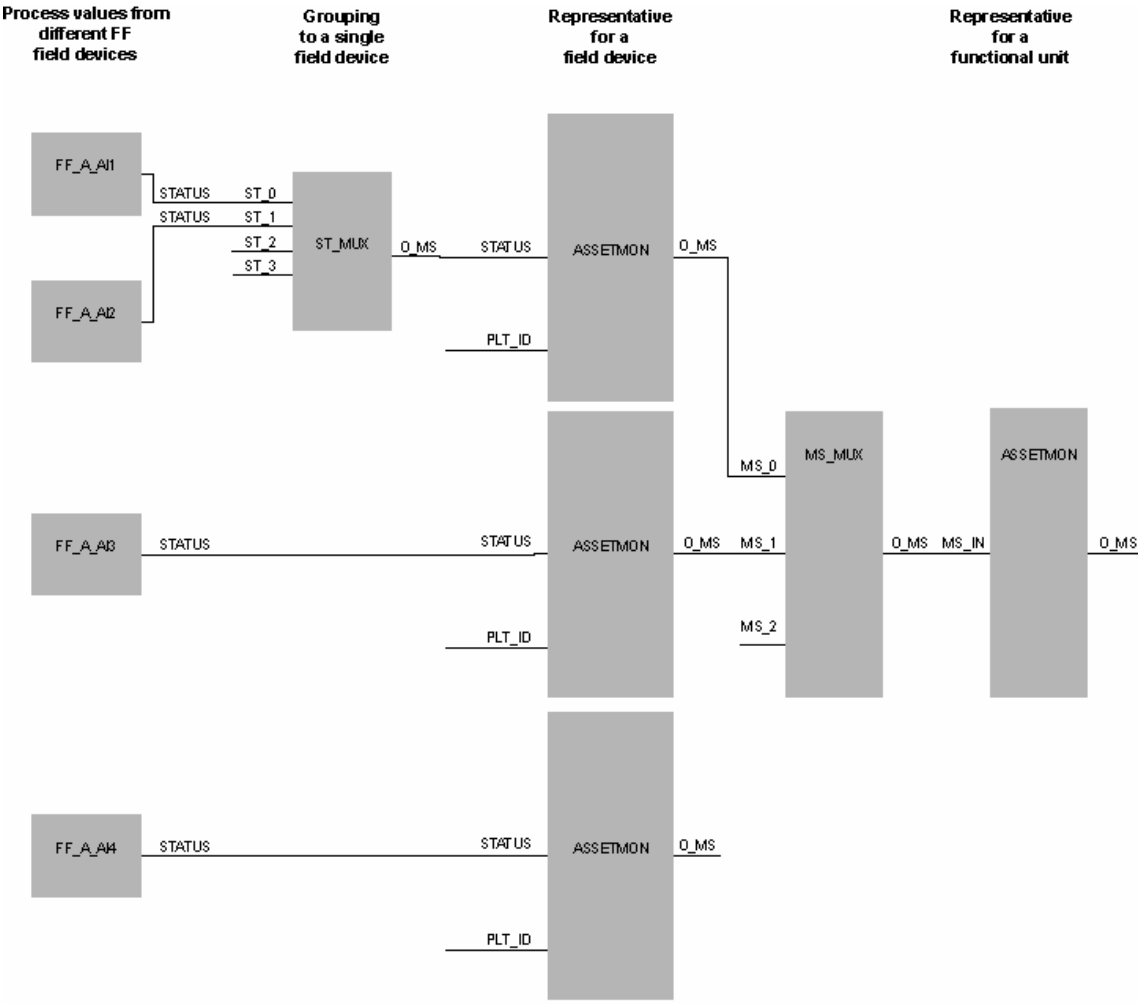
Basic procedure

1. Insert an ASSETMON block into the CFC chart for each FF device
2. Interconnect the STATUS outputs of the FF_A_xx blocks of each FF device with the STATUS input of the ASSETMON block using the ST_MUX block
3. Enter the PLT ID of the corresponding device at the PLT_ID input of the ASSETMON block

Installing the "ASSETMON" CFC

It is advisable to create a new hierarchy folder in the user diagnostics area of the PH and to group all ASSETMON blocks of an FF segment in this folder, for example. The example below shows the ASSETMON block directly in the root folder.

Example of the layout of a CFC chart for FF device diagnostics (DIAG_FF), including the interconnections with the FF_A_xx blocks of the FF devices by way of the ST_MUX and MS_MUX blocks:



ST_MUX:FB for weighted multiplexing of up to 10 PVra value states to PA profile 3.0

MS_MUX:FB for weighted multiplexing of up to 10 MST

ST_IN:Interconnectable input for the raw value status with influence on the MST of ASSETMON

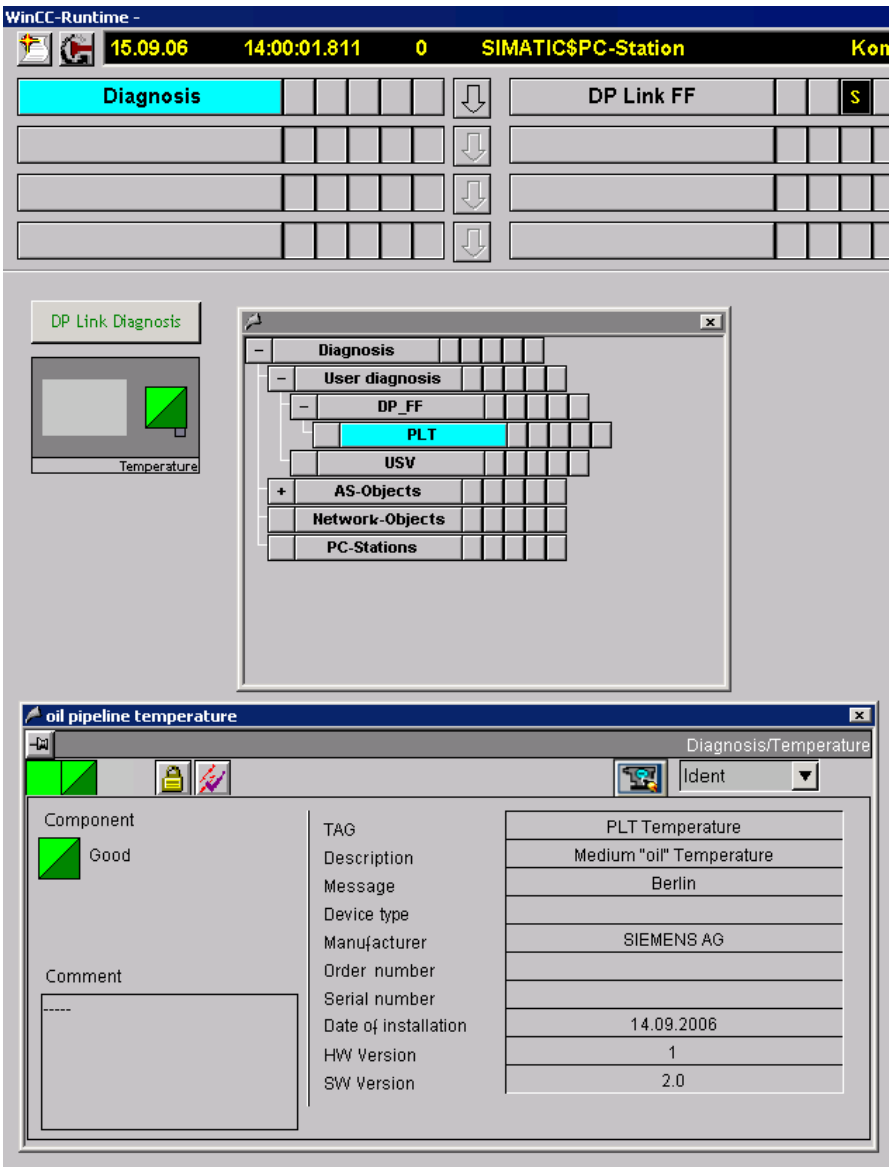
MS_IN:Inteconnectable input for an O_MS with influence on the MST of ASSETMON

Diagnostics screen (user diagnostics)

The **Options > Plant hierarchy > Create/update diagnostic screens** command initiates insertion of a symbol in the process image for each ASSETMON block.

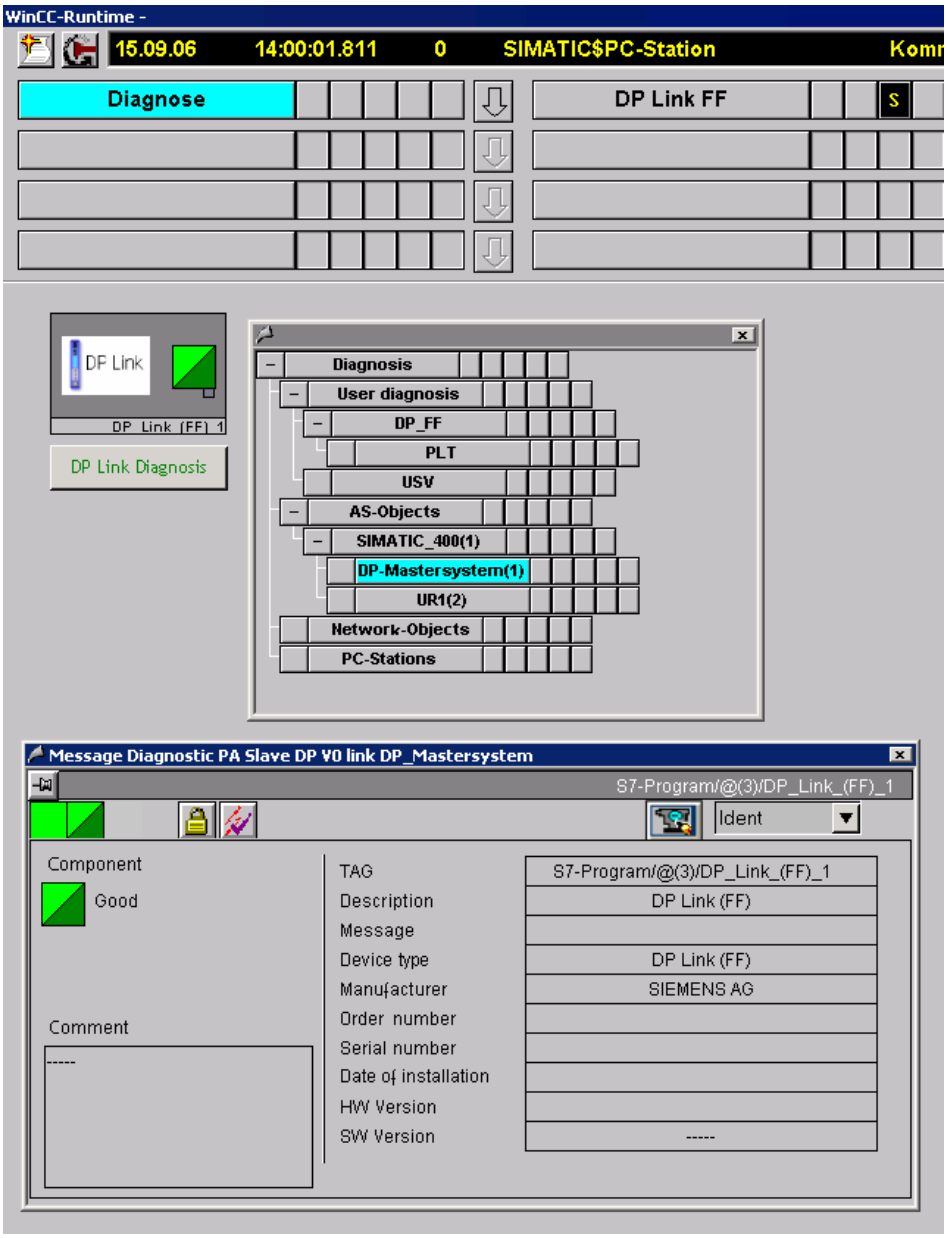
Click on this symbol to open the faceplate of the ASSETMON block. The faceplate visualizes the current maintenance status and the information saved to PDM configuration data of the FF device.

The next screenshot shows the generated symbols and an open faceplate (without stored data).



Insert an additional button (DP Link diagnostics in this example) into the diagnostics screen which was automatically generated for the PROFIBUS DP segment that contains the programmed DP/FF Link. Operators can use this button to change to the status view of the FF devices. Configure a button in the status view which operators can use to return to the previous view (see the chapter 3.1.3).

The next screenshot shows a practical example of a diagnostics screen with "DP Link diagnostics" button.



3.1.3 How to insert a button into the picture

Prerequisite

The diagnostics screen is open in Graphics Designer.

Basic procedure

1. Select the "Windows Objects > Button" from the object palette
2. Keeping the left mouse button pressed, draw a rectangle that matches the size of your button in the diagnostics screen
   The "Button Configuration" dialog box opens
3. Configure all properties of the button in this dialog box

Additional information

Additional information is available in the Graphics Designer Online Help.

Block description

4

4.1 User blocks / diagnostics blocks

Description

The functionality of FF_A_xx signal processing blocks is similar to that of the PA_xx blocks of the PCS 7 Library. This section only covers the differences between these blocks.

- Digital I/O for process values of the type WORD
  The corresponding I/Os of the signal processing blocks are adapted, as the binary process values are available as WORD type in the process image
- I/O for the status of process values of the type WORD
  All status are available in the process image of the CPU as 2- byte values of the type WORD

Configuring the user blocks

Signal processing blocks:

- FF_A_AI
- FF_A_AO
- FF_A_DI
- FF_A_DO

Place the blocks into the CFC and interconnect the analog and digital values with their corresponding address in the process image of the CPU.

Note

Include the Quality Code when interconnecting the output values.

The driver generator automatically interconnects the MODE input. The OMODE_xx output of the MOD_PAL0 or MODE_PAX0 block contains information about higher-priority errors which are evaluated by the FF_A_xx block.

Brief description of the blocks

Block name	FB	Install for…	Function
FF_A_AI	FB410	Each channel of the FF device	The FF_A_AI block processes the "Transmitter" PA profile of the FF field devices.
FF_A_AO	FB411	Each channel of the FF device	The FF_A_AO block processes the "Actuator" PA profile of the FF field devices.
FF_A_DI	FB412	Each channel of the FF device	The FF_A_DI block is called for reading digital values (Discrete Input) from FF field devices.
FF_A_DO	FB413	Each channel of the FF device	The FF_A_DO is called for outputting digital values (SP or RCAS_IN max. 8) to FF field devices.
ASSETMON	FB86	Each FF device	Interface between PCS 7 Maintenance Station and the FF devices
ST_MUX	FC287	each FF device with more than one channel	The ST_MUX blocks determines the status of an FF field device by selecting the worst-case status of the FF_A_DI, FF_A_AI, FF_A_DO and FF_A_AO signal processing blocks of the field device.
MS_MUX	FC288	Each functional unit	The MS_MUX block determines the maintenance status (MS) of a functional unit which consists of several FF field devices by selecting the worst-case status from the FF field devices.

Configuring the diagnostics block

The DIAG_AB block is placed, programmed and interconnected automatically (CFC function: Generate module drivers).

Brief description of the block

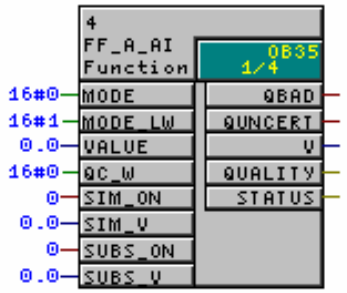
Block name	FB	Install for…	Function
DIAG_AB	FB414	each Anybus DP Link	The DIAG_AB block evaluates the status word of the Anybus DP Link (slave) and acknowledges new error messages using the control word of the slave.

Additional information

- Additional information relating to the user blocks and to the diagnostics block is available in the Online Help of the block
- Additional information in terms of functionality and interconnection of the ASSETMON block is available in the *Process Control System PCS 7 Operator Station* Configuring Manual

4.1.1 FF_A_AI block

Function and operating principle



The cyclic FF_A_AI block reads the process value and the status byte (Quality Code) of the FF field device from the process image (partition). The process value is available as physical unit. The STATUS byte contains information about the status of the FF field device.

Parameters used

The value at MODE_LW is programmed by the "Generate module drivers" function.

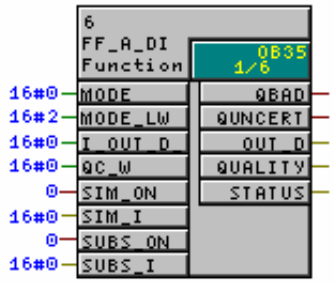
Block	Parameters used	MODE_LW
FF_A_AI	OUT	16#0001

Additional information

Additional information about the FF_A_AI block is available in the PCS 7 Library Online Help.

4.1.2 FF_A_DI block

Function and operating principle



The FF_A_DI block forms the interface between the FF field device and the blocks of the SIMATIC PCS 7 libraries. It can be interconnected with other SIMATIC S7 blocks.

The cyclic block reads the process value (I_OUT_D_W) and the status word of the FF field device (structure according to Discrete Input of the PA profiles). The STATUS byte contains information about the status of the FF field device. The process value and important status byte information are made available at the output interface in bit format in order to enhance interconnection options. These bit combinations are compliant with specifications in PROFIBUS "General Requirements".

Parameters used

The value at MODE_LW is programmed by the "Generate module drivers" function.

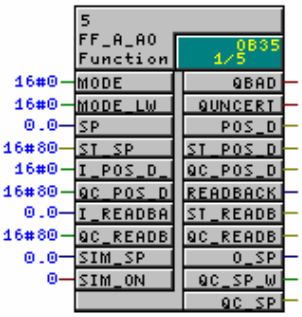
Block	Parameters used	MODE_LW
FF_A_DI	OUT_D	16#0002

Additional information

Additional information about the FF_A_DI block is available in the PCS 7 Library Online Help.

4.1.3 FF_A_AO block

Function and operating principle



The block reads the user data from a process image (partition) and writes these to the process image (partition), depending on the selected user data configuration (parameters of input MODE_LW).

The coding of the selected user data configuration must be programmed at input variable MODE_LW in accordance with the MODE settings for FF devices. This setting defines which variables in the process image (partition) the block has to read and write.

The block writes the setpoint (SP) and Quality Code (syntax of process setpoints and values in accordance with Analog Output of the PA profiles, REAL with 1-byte Quality Code) to the process image (partition). The setpoint and other analog variables are available as physical unit in the PA profile. The Quality Code contains information about the setpoint status. The coding of this QC is described in PROFIBUS 3.0 "General Requirements". You may optionally transfer the RCAS_IN command variable and the Quality Code to the process image (partition) within the same cycle.

Parameters used

Input MODE_LW (Mode low word) must be programmed in order to obtain information about the I/O used. Available MODE_LW values:

Block	Parameters used	MODE_LW
FF_A_AO	SP	16#0100
	SP, READBACK, POS_D	16#0103
	SP, CHECK_BACK	16#0104
	SP, READBACK, POS_D, CHECK_BACK	16#0105
	RCAS_IN, RCAS_OUT	16#0206
	RCAS_IN, RCAS_OUT, CHECK_BACK	16#0207

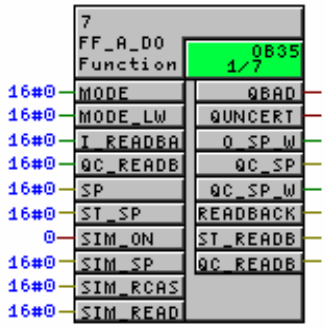
Block	Parameters used	MODE_LW
	SP, RCAS_IN, READBACK, RCAS_OUT, POS_D, CHECK_BACK	16#0308

Additional information

Additional information about the FF_A_AO block is available in the PCS 7 Library Online Help.

4.1.4 FF_A_DO block

Function and operating principle



The FF_A_DO block reads the user data from a process image (partition) and writes these to the process image (partition), depending on the selected user data configuration (parameters of input MODE_LW).

The coding of the selected user data configuration must be programmed at input variable MODE_LW in accordance with the MODE settings for FF devices. This setting defines which variables in the process image (partition) the block has to read and write.

The block writes the setpoint (O_SP_W) and the Quality Code (QC_SP_W) to the process image (partition). The Quality Code contains the information about the setpoint status. The coding of this QC is described in PROFIBUS 3.0 "General Requirements". You may optionally transfer the setpoint alongside with the Quality Code to the process image (partition) within the same cycle if the RCAS status is set (Remote Cascade) (RCAS_IN).

Parameters used

Input MODE_LW (Mode low word) must be programmed in order to obtain information about the I/O used. Available MODE_LW values:

Block	Parameters used	MODE_LW
FF_A_DO	SP_D	16#0400
	SP_D, READBACK_D	16#0409
	SP_D, CHECKBACK_D	16#040A
	SP_D, READBACK_D, CHECK_BACK_D	16#040B
	RCAS_IN_D, RCAS_OUT_D	16#050C
	RCAS_IN_D, RCAS_OUT_D, CHECK_BACK_D	16#050D

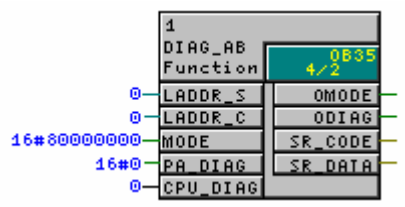
Block	Parameters used	MODE_LW
	SP_D, RCAS_IN_D , READBACK_D, RCAS_OUT_D, CHECK_BACK_D	16#060E

Additional information

Additional information about the FF_A_DO block is available in the PCS 7 Library Online Help.

4.1.5 DIAG_AB block

Function and operating principle



The cyclic DIAG_AB block analyzes the status word of the Anybus DP Link slave.

The OMODE and PA_DIAG outputs are set "bad" if the block detects the failure of a Modbus device or a higher-priority error at input MODE:

Parameters	Value	Description
OMODE	16#40000001	Higher-priority error
ODIAG	16#00400000	Invalid values, process-specific

The status "good" is set at the outputs after an error has been cleared.

Parameters	Value	Description
OMODE	16#80000001	Valid value
ODIAG	PA_DIAG	Diagnostics information from the PADP_L10 or PADP_L01 block

The SR_CODE and SR_DATA outputs display the most recent status register values returned by the Anybus DP Link. The meaning of SR_DATA depends on the SR_CODE:

SR_CODE	SR_DATA	Description
16#00	Number of transmission retries	A read or write operation at an FIM register has failed to due an error and must be restarted
16#01	FIM address	No connection to the FIM
16#03	FIM address	The FIM has transferred more data than expected
16#04	FIM address	An error which cannot de defined in detail has occurred
16#1F	---	No active error

I/O parameters

Parameters	Type	Type	Description
CPU_DIAG	STRUCT	I/O	CPU diagnostics (system structure)
LADDR_C	INT	I	Logical address of the control word
LADDR_S	INT	I	Logical address of the status word
MODE	DWORD	I	Value status Mode for further interconnection with MOD_PAL0/MOD_PAX0
ODIAG	DWORD	O	Field devices, diagnostics information
OMODE	DWORD	O	Value status of the slave
PA_DIAG	DWORD	I	Diagnostics information
SR_CODE	BYTE	O	Code of the status register
SR_DATA	BYTE	O	Data of the status register

Additional information

Additional information about the DIAG_AB block is available in the PCS 7 Library Online Help.

Technical data / approvals

5

5.1 Y Link

Additional information

Additional information about the Y Link is available in the *SIMATIC; Bus Coupling DP/PA Link and Y Link* Manual.

5.2 Anybus DP Link

Technical data

User Manual
Anybus Communicator for Profibus
http://www.anybus.com/
(ABC Profibus User Manual)

Approvals

User Manual
Anybus Communicator for Profibus
http://www.anybus.com/
(ABC Profibus User Manual)

5.3 Fieldbus Interface Module

Technical data

Reference Manual
Rosemount 3420
Fieldbus Interface Module
http://www.emersonprocess.com/

Appendix A

Approvals

Reference Manual
Rosemount 3420
Fieldbus Interface Module
http://www.emersonprocess.com/

Appendix B

Glossary

CP	Communication Processor
DP	Distributed Peripherals – high-speed serial transmission protocol for interconnecting a central AS with distributed I/O devices.
DP master	A node with master function on PROFIBUS DP. A master that responds in compliance with the DP Protocol to EN 50170 is a DP master. Only the master stations are granted bus access by token passing. The slaves, namely DP slaves, can only respond to master requests. We distinguish between the following types: DP master (class 1): Controls user data exchange with its assigned DP slaves. DP master (class 2): Provides services such as reading I/O data, diagnostics, and global control.
DP master system	The DP master and all its assigned DP slaves form a DP master system. This system is a component of the PROFIBUS subnet. Different DP master systems are identified by different numbers.
DP slave	Field device for pre-processing signals. One of its properties is that, instead of existing real I/O devices, the I/O area made available to the DP master corresponds with the I/O area mapped by the pre-processing CPU. An intelligent DP slave is a signal pre-processing field device. One of its properties is that, instead of existing real I/O devices, the I/O area made available to the DP master corresponds with the I/O area mapped by the pre-processing CPU.
DPV0	Defines a slave which exchanges data only with this master in accordance with the standard DP profile (DPV0 or cyclic data traffic). (This term has become relevant with the introduction of 'DPV1'. DPV0 is also used synonymously to define 'cyclic data exchange in

accordance with the DP standard'.)

DPV1

Short name for the extended DP functionality of PROFIBUS DP (IEC 61158).
The DPV1 services add certain features to the current PROFIBUS standard. The functions for reconfiguring slave parameters in run and for non-cyclic data traffic are two of the most important features, for example. DPV1 usually refers to non-cyclic data traffic which is triggered by a user program only on request and which initiates these services.

Fieldbus Foundation

The Fieldbus Foundation is an organization which resides in the USA, with companies who develop and produce fieldbus systems or corresponding components forming the primary membership. It was founded in September 1994 by the fusion of two and up to this date autarkic organizations, namely the "WorldFIP North America" and the "Interoperable Systems Project"(ISP). The organization is focused on the development of harmonized standards and on the proposal of corresponding standards, for example, to IEC.

http://www.fieldbus.org/

GSD file

GSD files contain the DP slave description to DIN E 19245 Part 3 or EN 50170.

MODBUS

The MODBUS communication protocol is based on master / slave or client / server architectures. It was created by Modicon in the year 1979 for controlling communication with their PLC systems. Due to its open structure the MODBUS protocol has since developed into a standard in industry.
MODBUS supports the interconnection of a master (of a PC, for example) with several clients (measurement and control systems, for example).

PROFIBUS DP

PROFIBUS with DP protocol which conforms to EN 50170. DP stands for Distributed Peripherals (high-speed, real-time capable, cyclic data exchange). User programs address this distributed I/O similar to central I/O.

SIMATIC

Siemens automation system

Index